

IN THE CLAIMS:

1. – 43. *cancelled*

44. (*currently amended*) A method of operating a computer processor, the computer processor using computer software, the computer software being is configured to simulate both the electrical characteristics and the optical characteristics of an SOI-based integrated optical/electronic circuit, the method comprising:

a) ~~generating topology information and free carrier concentration information by~~ simulating operation of at least certain electronics circuits components of said SOI-based integrated optical/electronic circuit using an electronic design portion of the computer software to generate as outputs dopant profiles, topology information and free-carrier concentration information and time-dependent variations in the free-carrier concentration as a function of applied voltage;

b) applying the output information from the electronic design portion of the computer software as inputs to an optical design portion of the computer software to extract top-level optical parameters such as optical loss, optical phase and extinction; and

c) ~~co-simulating electrical and optical behavior operation of at least certain optical circuit~~ of said integrated optical/electronic circuit through said electrical and optical computational engines to predict the optical behavior of said SOI-based integrated optical/electronic circuit in an optical design portion in response to said topology information and said free carrier concentration information generated by said electronic design portion.

45. – 46. *cancelled*

47. (*currently amended*) The method of claim 44, wherein ~~said~~ the electronic design portion of the computer software includes at least one of the group consisting of a process simulation portion, a device simulation portion, a layout portion, a parasitic extraction portion, and a circuit simulation portion.

48. (currently amended) The method of claim 44, wherein said optical design portion of the computer software further comprises at least one of the group consisting of: ~~a waveguide grating portion, a diffraction optical element portion,~~ a finite difference time domain (FDTD) portion, ~~a thin film portion,~~ a beam propagation method portion, and a raytracing portion.

49. – 54. cancelled

55. (currently amended) The method of claim ~~44~~ 54, wherein the optical design portion of the computer software ~~simulation design tools portion~~ partially models a waveguide included in said at least certain optical circuits components of the SOI-based integrated optical/electronic circuit.

56. (currently amended) The method of claim 55, wherein the said SOI ~~substrate circuit~~ includes a substrate layer, and wherein the said waveguide at least partially extends within said substrate layer.

57. cancelled

58. (new) The method of claim 44, wherein the electronic design portion of the computer software simulates at least one electronic circuit component from the group of a p-n device, a field plated device, an avalanche photodiode, a Schottky device, a MOSCAP, and a MOSFET.